

What is claimed is:

1. An electroless-plating liquid for selectively forming a plated film on a surface of an exposed interconnect of a semiconductor device having an embedded interconnect structure, said electroless-plating liquid comprising cobalt ions, a complexing agent, and a reducing agent free from alkali metal.

2. The electroless-plating liquid according to claim 1, wherein said reducing agent comprises an alkylamine borane.

3. The electroless-plating liquid according to claim 1, further comprising at least one of a stabilizer selected from one or more kinds of heavy metal compounds and sulfur compounds, and a surfactant.

4. The electroless-plating liquid according to claim 1, wherein a pH of said electroless-plating liquid is adjusted within the range from 5 to 14 using a pH adjusting agent free from alkali metal.

5. An electroless-plating liquid for selectively forming a plated film on a surface of an exposed interconnect of a semiconductor device having an embedded interconnect structure, said electroless-plating liquid comprising cobalt ions, a complexing agent, a compound containing a refractory metal, and a reducing agent free from alkali metal.

6. The electroless-plating liquid according to claim 5, wherein said refractory metal comprises at least one of tungsten and molybdenum.

5 7. The electroless-plating liquid according to claim 5, wherein said reducing agent comprises an alkylamine borane.

8. The electroless-plating liquid according to claim 5, further comprising at least one of a stabilizer selected from one
10 or more kinds of heavy metal compounds and sulfur compounds, and a surfactant.

9. The electroless-plating liquid according to claim 5, wherein a pH of said electroless-plating liquid is adjusted within
15 the range from 5 to 14 using a pH adjusting agent free from alkali metal.

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10. A semiconductor device having an embedded interconnect structure of copper, copper alloy, silver or silver alloy
20 interconnect, wherein a surface of an exposed interconnect is selectively covered with a protective film, said protective film being formed by an electroless-plating process with use of an electroless-plating liquid, said electroless-plating liquid comprising cobalt ions, a complexing agent, and a reducing agent
25 free from alkali metal.

11. The semiconductor device according to claim 10, wherein said reducing agent comprises an alkylamine borane.

12. The semiconductor device according to claim 10, wherein
said electroless-plating liquid further comprises at least one of
a stabilizer selected from one or more kinds of heavy metal
5 compounds and sulfur compounds, and a surfactant.

13. The semiconductor device according to claim 10, wherein
a pH of said electroless-plating liquid is adjusted within the range
from 5 to 14 using a pH adjusting agent free from alkali metal.

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14. A semiconductor device having an embedded interconnect
structure of copper, copper alloy, silver or silver alloy
interconnect, wherein a surface of an exposed interconnect is
selectively covered with a protective film, said protective film
15 being formed by an electroless-plating process performed with use
of an electroless-plating liquid, said electroless-plating liquid
comprising cobalt ions, a complexing agent, a compound containing
a refractory metal, and a reducing agent free from alkali metal.

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15. The semiconductor device according to claim 14, wherein
said refractory compound comprises at least one of tungsten and
molybdenum.

16. The semiconductor device according to claim 14, wherein
25 said reducing agent comprises an alkylamine borane.

17. The semiconductor device according to claim 14, wherein
said electroless-plating liquid further comprises at least one of

a stabilizer selected from one or more kinds of heavy metal compounds and sulfur compounds, and a surfactant.

18. The semiconductor device according to claim 14, wherein
5 a pH of said electroless-plating liquid is adjusted within the range from 5 to 14 using a pH adjusting agent free from alkali metal.

19. A semiconductor device having an embedded interconnect structure, wherein a surface of an exposed interconnect is
10 selectively covered with a protective film of a metal comprising cobalt.

20. The semiconductor device according to claim 19, wherein said protective film has a thickness within the range from 0.1 to
15 500 nm.

21. A semiconductor device having an embedded interconnect structure, wherein a surface of an exposed interconnect is selectively covered with a protective film of an alloy comprising
20 cobalt and a refractory metal.

22. The semiconductor device according to claim 21, wherein said refractory metal comprises at least one of tungsten and molybdenum.

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23. The semiconductor device according to claim 21, wherein said protective film has a thickness within the range from 0.1 to 500 nm.